CLAIMS

What is claimed is:

1. A distributed multiprocessing computer system, with a plurality of microprocessors, which comprise:

a router to route message packets between said microprocessors, and wherein said router prioritizes message packets based upon type of message packet, age of the message packet, and source of the message packet; and

a plurality of network input ports and network output ports connecting said plurality of microprocessors to form a computer network, wherein each of said network input ports couples to one or more associated local arbiters in the router, each of said local arbiters operable to select a message packet among message packets waiting at the network input port.

2. The distributed multiprocessing computer system of claim 1 wherein said router includes a plurality of starvation timers that indicate when a message packet must be immediately dispatched.

3. The distributed multiprocessing computer system of claim 1 wherein said microprocessor further includes a plurality of microprocessor input ports and microprocessor output ports that allow the exchange of message packets between hardware functional units in the microprocessor and between microprocessors.

4. The distributed multiprocessing computer system of claim 3 wherein each of said microprocessor input ports couples to local arbiters in the router, each of said local arbiters able to select a message packet among message packets waiting at the microprocessor input port.

5. The distributed multiprocessing computer system of claim 4 wherein each of said network output ports and microprocessor output ports couples to a global arbiter in the router that selects a message packet from message packets nominated by the local arbiters of said network input ports and microprocessor input ports.

6. The computer system of claim 5 wherein if a first message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the first message packet type from the global arbiter of the destination network output port or microprocessor output port.

7. The computer system of claim 6 wherein if a second message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the second message packet type from the global arbiter of the destination network output port or microprocessor output port.

8. The computer system of claim 7 wherein if a third message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the third message packet type from the global arbiter of the destination network output port or microprocessor output port.

9. The computer system of claim 8 wherein if a fourth message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests

service for the fourth message packet type from the global arbiter of the destination network output port or microprocessor output port.

10. The computer system of claim 9 wherein if a fifth message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the fifth message packet type from the global arbiter of the destination network output port or microprocessor output port.

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11. The computer system of claim 10 wherein if a sixth message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the sixth message packet type from the global arbiter of the destination network output port or microprocessor output port.

12. The computer system of claim 11 wherein if a seventh message packet type is ready to be dispatched from the network input port or microprocessor input port, the local arbiter requests service for the seventh message packet type from the global arbiter of the destination network output port or microprocessor output port.

13. The computer system of claim 5 wherein said network output port global arbiter or microprocessor output port global arbiter selects said message packet Least-Recently-Granted from the network input ports, then Least-Recently-Granted from the microprocessor input ports if said network output port or microprocessor output port is idle.

14. A method of routing messages in a distributed multiprocessing computer system to reduce routing latency, comprising:

selecting a message packet at each of a plurality of microprocessor router input ports from message packets buffered at each input port based on the type of message packet; and

transmitting from an idle microprocessor router output port a message packet chosen from the plurality of selected microprocessor router input port message packets, said message packet chosen for transmission by the output port based on the microprocessor router input port priority.

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15. The method of claim 14 wherein said selecting a message packet includes the step of:

determining if a Block Response packet is ready to be dispatched from the input port buffer; and

if the Block Response packet is ready, selecting the Block Response packet.

16. The method of claim 15 wherein said selecting a message packet includes the step of:

if no Block Response packet is ready, determining if a Acknowledgment packet is ready to be dispatched from the input port buffer; and

if the Acknowledgment packet is ready, selecting the Acknowledgment packet.

17. The method of claim 16 wherein said selecting a message packet includes the step of:

if no Acknowledgment packet is ready, determining if an Invalidation Broadcast packet is ready to be dispatched from the input port buffer; and

if the Invalidation Broadcast packet is ready, selecting the Invalidation Broadcast packet.

18. The method of claim 17 wherein said selecting a message packet includes the step of:

if no Invalidation Broadcast packet is ready, determining if a Forward packet is ready to be dispatched from the input port buffer; and

if the Forward packet is ready, selecting the Forward packet.

Sub A2

19. The method of claim 18 wherein said selecting a message packet includes the step of:

if no Forward packet is ready, determining if a Request packet is ready to be dispatched from the input port buffer; and

if the Request packet is ready, selecting the Request packet.

20. The method of claim 19 wherein said selecting a message packet includes the step of:

if no Request packet is ready, determining if a Write I/O packet is ready to be dispatched from the input port buffer; and

if the Write I/O packet is ready, selecting the Write I/O packet.

21. The method of claim 20 wherein said selecting a message packet includes the step of:

if no Write I/O packet is ready, determining if a Read I/O packet type is ready to be dispatched from the input port buffer; and

if the Read I/O packet is ready, selecting the Read I/O packet.

22. The method of claim 14 wherein said transmitting a message packet includes the step of prioritizing said message packet Least-Recently-Granted from network input ports, then Least-

Recently-Granted from microprocessor input ports, wherein said network input ports and said microprocessor input ports are microprocessor router input ports.

23. A distributed multiprocessing computer system, comprising:

means for selecting a message packet at each of a plurality of microprocessor router input ports from message packets buffered at each input port based on the type of message packet; and

means for transmitting from an idle microprocessor router output port a message packet chosen from the plurality of selected microprocessor router input port message packets, said message packet chosen for transmission by the output port based on the microprocessor router input port priority.

24. A distributed multiprocessing computer system, with a plurality of microprocessors, which comprise:

a router to route message packets between said microprocessors, and wherein said router prioritizes message packets based upon type of message packet, age of the message packet, and source of the message packet;

a plurality of network input ports and network output ports connecting said plurality of microprocessors to form a computer network, wherein each of said network input ports couples to one or more associated local arbiters in the router, each of said local arbiters operable to select a message packet among message packets waiting at the network input port;

wherein each of said microprocessors further includes a plurality of microprocessor input ports and microprocessor output ports that allow the exchange of message packets between hardware functional units in the microprocessor and between microprocessors; and

a disk drive coupled to each of said plurality of microprocessors.